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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/550,805

07/12/2006

Tominaga Koji

FUJ-0001

3990

23413 7590 10/17/2008
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EXAMINER

LUKE, DANIEL M

ART UNIT

PAPER NUMBER

2813

NOTIFICATION DATE

DELIVERY MODE

10/17/2008

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

usptopatentmail@cantorcolburn.com

Office Action Summary	Application No. 10/550,805	Applicant(s) KOJI ET AL.	
	Examiner DANIEL LUKE	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 September 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This office action is in response to the RCE filed 9/2/2008.

Currently, claims 1-12 are pending. Claims 10-12 have been added.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 8, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Conley et al. (US 2004/0203254).

Pertaining to claim 1, Conley shows a method, comprising: forming an insulating film in a semiconductor device ([0002]), wherein the insulating film has a thickness in the range of less than two monolayers to 5 nm ([0059]; this number is taken as the overall thickness of the two insulating layers); and removing impurities from the insulating film ([0052], lines 6-14), wherein the removing impurities is performed at a temperature greater than 500°C ([0052], lines 10-14), to form an insulating film having a prescribed thickness ([0053], lines 1-3).

Pertaining to claim 8, Conley shows a method, comprising: forming an insulating film in a semiconductor device ([0002]), wherein the insulating film has a thickness in the range of less than two monolayers to 5 nm ([0059]; this number is taken as the overall thickness of the two insulating layers); and removing impurities from the insulating film to form an insulating film having a prescribed thickness ([0052], lines 6-14).

Art Unit: 2813

Pertaining to claims 10 and 11, Conley shows the steps of forming an insulating film and removing impurities from the insulating film are performed sequentially a plurality of times until a prescribed thickness is achieved ([0053], lines 1-3).

Although Conley does not show the specific insulating film thickness range as claimed in claims 1 and 8, the court has held that "[A] prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a *prima facie* case of obviousness." *In re Peterson*, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003).

Claims 2-7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Conley in view of Colombo et al. (US 2005/0136690).

Conley teaches the method of claim 1.

Pertaining to claim 9, Conley shows a method, comprising: forming an insulating film in a semiconductor device ([0002]), wherein the insulating film has a thickness in the range of less than two monolayers to 5 nm ([0059]; this number is taken as the overall thickness of the two insulating layers); and removing impurities from the insulating film ([0052], lines 6-14) to form an insulating film having a prescribed thickness ([0053], lines 1-3).

Pertaining to claim 12, Conley shows the steps of forming an insulating film and removing impurities from the insulating film are performed sequentially a plurality of times until a prescribed thickness is achieved ([0053], lines 1-3).

Conley fails to show, pertaining to claim 2, removing impurities is performed in a reducing gas atmosphere; and, pertaining to claims 3 and 9, removing impurities comprises a first treatment in a reducing gas atmosphere and a second treatment in an oxidizing gas

Art Unit: 2813

atmosphere. Pertaining to claims 4-7, Conley fails to show the possible gases that make up the reducing and oxidizing gas atmospheres.

However, Colombo teaches in [0013] – [0014] that a high-k dielectric film is subjected to two anneals, both at temperatures in the range of 500°C to 1100°C. The first anneal is performed in a reducing gas atmosphere ([0013], lines 1-4). The reducing gas atmosphere may comprise, for example, hydrogen ([0013], lines 7-8). The second anneal is performed in an oxidizing gas atmosphere ([0014], lines 1-4). The oxidizing gas atmosphere may comprise, for example, oxygen. These anneals act to remove impurities from the dielectric film ([0011]).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to perform the step of removing impurities in the method of Conley by a two-step anneal process in which the first anneal is performed in a reducing gas atmosphere and the second anneal is performed in an oxidizing gas atmosphere, as taught by Colombo. The motivation to do so is that the anneal process taught by Colombo reduces point defects and impurities in the dielectric film ([0005]).

Although Conley does not show the specific insulating film thickness range as claimed in claims 1 and 8, the court has held that “[A] prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a *prima facie* case of obviousness.” *In re Peterson*, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003).

Response to Arguments

Applicant's arguments filed 9/2/2008 have been fully considered but they are not persuasive.

Applicant argues that Conley does not teach or suggest that the thickness of the insulating film is limited to 0.3-2 nm and 0.5-2 nm, as claimed in claims 1 and 8, respectively. Applicant goes on to assert that the films of Conley are 5 nm thick, citing [0059].

However, as stated in [0059], the deposition of the first and second layers that make up the insulating layer is such that the layers are formed to a thickness of between less than a monolayer to 2.5 nm. This would equate to a total thickness of less than two monolayers to 5 nm. This by no means limits the thickness to 5 nm. Clearly, the range is from less than two monolayers to 5 nm. The claimed range of 0.2 (or 0.5) to 2 nm falls within the range taught by Conley. According to section 2144.05 of the MPEP:

"[A] prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness." In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003).

Therefore, the claims of the present invention are rendered obvious over Conley.

Art Unit: 2813

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL LUKE whose telephone number is (571)270-1569. The examiner can normally be reached on Monday through Friday 8:30 a.m. to 5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. L./
Examiner, Art Unit 2813
10/8/2008

/Matthew S. Smith/
Supervisory Patent Examiner, Art Unit
2823